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OBSERVATIONS ON THE GROWTH AND REPRODUCTION OF  
SOME VARIETIES OF MAIN-CROP RICE  
AND "CHIEM" RICE

- North Vietnam -

[Following is a translation of an article by Vo Hung in the Vietnamese-language periodical Khoa Hoc Ky Thuat Nong Nghiep (Agricultural Sciences and Technology), Hanoi, Jan 1964, pp 20-21.]

RICE GROWING TECHNIQUES

An understanding of the growth and reproduction of rice varieties is essential for scheduling the seeding, planting and fertilizing operations, and for the selection of appropriate soil. At the experimental farm of the Central Secondary School of Agriculture (Hanoi), we have studied the growth and reproduction of 45 varieties of main-crop rice and 16 varieties of "chiem" rice in mixed clayey fields with normal water and climatic conditions in suburban Hanoi.

Weather Conditions

④ Tháng	11	12	1	2	3	4	5	6	7	8	9	10	11
⑥ Ôn độ C	22,1	17,0	17,2	18,8	22,5	22,6	26,6	29,6	27,0	28,5	26,6	24,3	22,0
⑦ Ẩm độ %	84	79	79	80	89	81	79	77	85	85	86	82	70,0
⑧ Lượng mưa (mm)	40,4	1	20,3	7,7	48,55	16,2	97,3	179,9	364,6	342,8	285,8	46,7	46,0

[Legend]: a) Month; b) Temp. (C.); c) Humidity (%); d) Rainfall (mm).

I. Growth and Reproduction of 45 Varieties  
of Main-Crop Rice (Seeded on 16 May;  
planted 27 June)

① Tên giống	② Bát dầu đẻ nhánh	③ Thời đè	④ Phân hóa đồng non	⑤ Phân hóa già	⑥ Trò	⑦ Phơi màu	⑧ Chúc xanh	⑨ Chín	⑩ Tông thời gian sinh trường (ngày)
Thàng lùn	6-7	4-8	5-8	10-8	4-9	5-9	21-9	6-10	144
Thanh bà	-	4-8	5-8	11-8	7-9	9-9	26-9	10-10	148
Nếp mao	-	5-8	5-8	10-8	7-9	9-9	26-9	10-10	148
Tè mồ	-	2-8	5-8	12-8	8-9	9-9	27-9	10-10	148
Nam đức lùn	-	2-8	?	?	8-9	10-9	27-9	11-10	149
Nam đức (K.S.M.)	-	8-8	12-8	18-8	10-9	13-9	27-9	13-10	151
Cháu con voi	-	20-8	21-8	27-8	22-9	24-9	?	23-1	161
Doan chung	-	20-8	21-8	26-8	21-9	22-9	10-10	23-10	161
Hìn	-	?	21-8	27-8	20-9	22-9	10-10	23-10	161
Hữu nguyễn	-	24-8	?	30-8	25-9	26-9	14-10	25-10	163
Gié sán	-	26-8	?	30-8	24-9	26-9	12-10	25-10	163
Dầu nguyễn	7-7	21-8	21-8	?	24-9	26-9	12-10	25-10	163
Dầu rưng	-	18-8	21-8	28-8	23-9	26-9	12-10	25-10	163
Sâm cành	-	20-8	25-8	3-9	24-9	27-9	12-10	26-10	164
Xô nương	-	20-8	25-8	5-9	24-9	26-9	13-10	26-10	164
K Cao-miên	-	25-8	?	?	25-9	26-9	13-10	26-10	164
Tám cành nồng	-	25-8	?	5-9	25-9	26-9	12-10	26-10	164
Nếp lòn-bình	-	20-8	25-8	3-9	24-9	26-9	?	26-10	164
Dầu đài trà	6-7	18-8	25-8	5-9	24-9	26-9	12-10	26-10	164
Dầu tây	-	25-8	25-8	4-9	25-9	26-9	13-10	26-10	164
Ngô vỹ chè	-	25-8	25-8	4-9	25-9	27-9	13-10	26-10	164
Khâu nương ruồ	8-7	20-8	25-8	3-9	27-9	29-9	17-10	29-10	169
Dầu hến	7-7	20-8	?	?	27-9	29-9	17-10	29-10	169
Kim son miên	-	28-8	1-0	?	29-9	1-10	17-10	29-10	169
Dự vàng	-	25-8	1-0	?	28-9	1-10	17-10	29-10	169
Chè ong	-	25-8	1-0	4-9	28-9	1-10	16-10	30-10	170
Tám thơm	-	28-8	?	4-9	3-10	5-10	19-10	3-11	174
Gié nước	-	28-8	?	4-9	2-10	5-10	18-10	3-11	174
Lúa Hải-lăng	-	?	1-0	4-9	1-10	2-10	19-10	3-11	174
Tè hiện	8-7	28-8	?	?	4-10	6-10	20-10	5-11	176
Dự lòn	-	28-8	1-0	10-9	3-10	4-10	22-10	5-10	176
Ôn	-	?	1-0	9-9	2-10	4-10	22-10	5-11	176
H López	7-7	30-8	5-9	12-9	6-10	8-10	25-10	7-11	178
Đi hương	-	30-8	5-9	13-9	7-10	8-10	24-10	7-11	178
Tè đồng	-	30-8	10-9	19-9	8-10	10-10	24-10	7-11	178
Hiên	-	30-8	10-9	19-9	7-10	9-10	23-10	7-11	178
K 106 A	-	30-8	10-9	18-9	6-10	8-10	24-10	7-11	178
Tám xoan	-	30-8	10-9	18-9	8-10	10-10	28-10	10-11	181
Tám cỏ ngồng	-	1-0	?	?	7-10	8-10	?	10-11	181
Tám trâu	-	?	?	?	9-10	11-10	?	10-11	181
Mùa số 1	-	1-0	9-9	17-9	7-10	9-10	28-10	10-11	181
Đi	-	1-0	9-9	18-9	8-10	11-10	28-10	11-11	182
813	-	?	?	21-9	12-10	14-10	?	15-11	186
Sai-bui-bao	-	1-0	15-9	21-9	14-10	15-10	?	15-11	186
Nếp quán	-	1-0	15-9	?	15-10	16-10	?	15-11	186

[Legend on next page]

[Legend]: a) Name; b) begin producing shoots; c) stop producing shoots; d) formation of ears; e) formation of spikelets; f) opening; g) formation of grains; h) full grains; i) ripe; j) Total time of growth (days).

II. Growth and Reproduction of 16 Varieties of "Chiem" Rice. (Seeded on 20 November; planted 20 January)

Dài trung	?	20-2	25-3	28-3	7-4	30-4	2-5	20-5	28-5	189
Chiem bắc	22-2	25-3	30-3	7-4	2-5	3-5	20-5	30-5	191	
Tám chiêm	22-2	25-3	30-3	7-4	2-5	4-5	20-5	31-5	192	
Chiem dọc	22-2	25-3	30-3	8-4	2-5	3-5	22-5	31-5	192	
Chiem chanh	22-2	25-3	30-3	8-4	2-5	4-5	22-5	31-5	192	
Bàu hương	24-2	?	2-4	10-4	3-5	4-5	22-5	31-5	192	
Bàu 157	24-2	28-3	2-4	10-4	2-5	4-5	24-5	31-5	192	
Chiêm cút	25-2	28-3	2-4	10-4	2-5	5-5	24-5	1-6	193	
Chiem xiêm	25-2	28-3	6-4	14-4	4-5	6-5	24-5	1-6	193	
Đi đồng	25-2	?	5-4	14-4	2-5	3-5	24-5	1-6	193	
Chiem tèp	24-2	28-3	5-4	14-4	4-5	6-5	24-5	3-6	195	
Sài đường	26-2	27-3	5-4	14-4	6-5	8-5	26-5	4-6	196	
Nép chiêm	26-2	28-3	8-4	16-4	7-5	9-5	26-5	4-6	196	
Chùm quang	26-2	28-3	8-4	16-4	9-5	11-5	26-5	6-6	198	
Chiem số 1	24-2	27-3	8-4	16-4	8-5	9-5	27-5	6-6	198	
Chiem 314	25-2	27-3	8-4	?	7-5	9-5	27-5	6-6	198	

III. CONCLUSION

1. For the group of varieties seeded on 16 May, and planted on 27 June:

The duration of growth for varieties of early main-crop rice varies from 144 to 151 days.

The duration of growth for varieties of regular main-crop rice varies from 161 to 178 days.

2. For the group of varieties seeded on 20 November, and planted on 20 January: the duration of growth varies from 189 to 198 days.

## NEW SOURCES OF FERTILIZER

### - North Vietnam -

[Following is a translation of an article by Nguyen Van Nhiep, Haiphong Experimental Farm, in the Vietnamese-language periodical Khoa Hoc Ky Thuat Nong Nghiep (Agricultural Sciences & Technology) Hanoi, January 1964, pages 22-23.]

"Dien Thanh" is a plant. This hearty plant can resist acidity, alkalinity, aridity and soaking, and it can be sown in any season. Its growth depends on soil and climatic conditions because it resists acidity better than it does alkalinity, moisture better than aridity, and heat better than cold.

The Haiphong Experimental Farm has fertilized its rice fields with "dien thanh." Following are the results obtained during the tenth-month season, in 1962.

#### 1. "Dien thanh" cut and transferred to different fields as a fertilizer.

"Dien thanh" was sown in March and April along ditches, roads and empty fields for main-crop rice... In June and July, "dien thanh" was cut; then it was brought to the rice fields and mixed into the soil. The experiment showed that "dien thanh" can be used as a substitute for manure. Indeed, it was more efficient than manure. Rice plants fertilized with "dien thanh" were green, hearty and gave high yields.

Fertilizer per hectare	Yield (piculs per hectare)
Manure (7 tons)	30.5
Manure (3.5 tons) + dien thanh (3.5 tons)	33.07
Manure (3.5 tons) + dien thanh (3.5 tons) + apatit 166 kilograms	35.00

2. "Dien thanh" grown among "chiem" rice plants and used as a fertilizer for main-crop rice.

"Dien thanh" was sown early in May in fields growing "chiem" rice -- when rice grains were almost mature. At the end of June, "dien thanh" was plowed under and the fields were prepared for planting the main-crop rice.

We found that rice plants fertilized with a mixture of "dien thanh" and manure were greener and taller than those fertilized with manure alone:

Fields without "dien thanh"	2,783 kg/ha.
Fields with "dien thanh"	3,184 kg/ha.

3. "Dien thanh" cultivated together with rice. Seeding was done with a Model 2-9 Seeding Machine (a device used in Haiphong for perpendicular [sic] seeding). One row of rice plants (with 10 cm spacing between plants in the same row), alternated with one row of "dien thanh" (also with 10 cm. spacing between plants of same row), at a spacing of 20cm between rows. After one month and 12 days, when it was 30 cm tall, "dien thanh" was hoed and buried between rows of rice plants. The density of rice plants was 40 x 10 cm. This method led to a definite increase in rice yields. We tested three schemes:

1. Rice seeded according to the pattern 20 x 20 cm.
2. Rice seeded according to the pattern 40 x 10 cm.
3. Rice seeded according to the pattern alternated with "dien thanh" 40 x 10 cm.

The third scheme was the best. The rice plants were green and gave full grains.

The scheme 20 x 20 cm. gave a yield of 3,210 kg/ha.

The scheme 40 x 10 cm. gave a yield of 3,210 kg/ha.  
The scheme 40 x 10 cm. with "dien thanh" gave a  
yield of 3,610 kg/ha.

Thus a gain of 400 kg/ha. was obtained by the use of 30 kg of "dien thanh" seeds (30 piasters) plus two man-days for seeding (concurrent with rice seeding); the labor for hoeing and burying was equivalent to the labor that would be required to carry fertilizer to the fields.

#### 4. "Dien thanh" used for making green fertilizer.

Green fertilizer is composed of dirt and "dien thanh" as the main ingredients. It is inferior to manure, and is considered as a supplementary fertilizer. It is often used in remote fields which have previously received little or no application of manure.

#### METHOD OF MANUFACTURE

An area is selected in the middle of the field to be fertilized. The soil should be good and moderately moist so that the "dien thanh" can grow vigorously without any special care. The area is plowed and harrowed in the same manner as that used in growing potatoes. On each 100 square meters spread 300 kg of manure (ten small shoulder-loads) and 45 kg of superphosphate; then, sow one kg of "dien thanh" seeds. Water if soil is too dry. When "dien thanh" is 60-80 cm high, plow and cover "dien thanh" with soil. Spread 30 kg of superphosphate and sow "dien thanh" seeds again. When "dien thanh" is sufficiently high, plow and cover over. Then, seed "dien thanh" once more if the time is available. The green fertilizer is needed from February to June. Ten days after the last seeding, the soil is used as a fertilizer. The final cost of this fertilizer is about 2.60 piasters per ton.

We have observed that green fertilizer acts fast but does not have a lasting effect. After each application, rice plants turn green and grow with vigor -- only to turn brown and wither shortly thereafter.

Seven tons of manure yielded 3,466 kg/ha.

Seven tons of green fertilizer yielded 3,220 kg/ha.

To fertilize rice, use "dien thanh" in any form including green fertilizer. Its final cost is low.

By observing the growth of rice plants fertilized with "dien thanh," and comparing the crop results, we estimated the effects of "dien thanh" in each form of application, as follows:

1. In green fertilizer, "dien thanh" is buried under dry, insulating soil. The warmth rapidly decomposes stems and leaves. Organic matter is digested. Nitrogen is, for the most part, absorbed in the soil. When spread in fields containing water, the fertilizing material in mineral form is dissolved in the water and absorbed by the plants. This explains the rapid effectiveness of green fertilizer (with manure the ability of rice to reproduce is 13.81, but with green fertilizer it is 14.66). However, the amount of fertilizing material is limited, therefore after a short period of vigorous growth, the plants turn yellow and wither.

2. When "dien thanh" is brought from the fields where it grows to different fields, its green leaves and stems are covered with soil. The leaves having a nitrogen content of 4.05 per cent decompose first. Afterwards, the stems with a lower nitrogen content decompose. Decomposition is slower in water than in dry soil. Hence, the fertility is longer lasting. We found that with this form of fertilizer rice plants do not turn brown, or, if they do turn brown, they do so in a very short time.

3. When buried *in situ*, "dien thanh" not only provides organic matter, but also a significant amount of nitrogen is derived from the bacteria living in the nodules. We noticed that in wet soil "dien thanh" plants do not have nodules in the lower roots; instead, most nodules appear in the higher roots less than three cm beneath the neck of the roots. The nodules are very large and occur in clusters of two or three. Some are found even at 4.5 cm above the neck of the roots. Furthermore, the root system is larger in wet soil than in dry soil. The ratio of roots to stem and leaves is 1:4 in dry soil and 1:3 in wet soil. For seven to ten tons/ha of stems and leaves, the roots yield at least two to three tons.

In brief, "dien thanh" as a fertilizer for rice plants is valuable both technically and economically.

To improve the quality of this fertilizer, the "dien thanh" should be buried deeper to avoid loss of nitrogen, and it should be applied many times in many small portions instead of one or two large applications as was the practice

in the past. In other words, the "dien thanh" fertilizer should be used in the same way as mineral nitrate fertilizers.

- END -